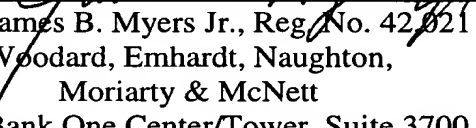


REMARKS

Entry of this Preliminary Amendment prior to the examination of this application is respectfully requested. Claims 54-71 have been added by this amendment, and the accompanying filing fee is based on the status of the claims after entry of this Amendment. Applicants respectfully request consideration of this application and Preliminary Amendment, and passage of this application to allowance.

Respectfully submitted,

By


James B. Myers Jr., Reg. No. 42,821
Woodard, Emhardt, Naughton,
Moriarty & McNett
Bank One Center/Tower, Suite 3700
111 Monument Circle
Indianapolis, Indiana 46204-5137
(317) 634-3456

ADDENDUM

3. (Amended) The apparatus of claim 1 [or 2] having an effective operating temperature below about 375K.
4. (Amended) The apparatus of claim 1 [or 2] having an effective operating temperature below about 300K.
5. (Amended) The apparatus of claim 1 [or 2], wherein said sensor includes at least two metallic electrodes.
7. (Amended) 7. The apparatus of claim 1 [or 2] and further comprising a circuit electrically coupled to said sensing member operable to apply a time varying electric field to said sensing member.
9. (Amended) The apparatus of claim 2 [or 8], wherein said gradient is established by a number of differently composed layers.
10. (Amended) The apparatus of [any of claims] claim 1 [or 2], wherein said sensing member is formed of $\text{PbZr}_x\text{Ti}_y\text{O}_3$; where x is in a range of about 0.5 to about 0.8 and y is in a range of about 0.2 to about 0.5.
15. (Amended) The apparatus of claim 1 [or 2], wherein said sensing member is comprised of an oxygen deficient ionic oxide material.
17. (Amended) A method of [use, comprising] detecting oxygen in an intake or exhaust stream of a vehicle with the apparatus of claim 1 [or 2].

18. (Amended) A method of [manufacture] manufacturing an oxygen sensing device, said method, comprising:

providing a source of ferroelectric material having a first region with a first composition and a second region with a second composition different from the first composition;

irradiating a portion of the first region and a portion of the second region with a laser to release a mixture from the source with a predetermined ratio of the first composition to the second composition; and

forming a layer of a sensing matrix from the mixture, the mixture corresponding to the ratio.

22. (Amended) The method of [any of claims] claim 18[-21] further comprising performing said irradiating of a number of different portions of the first and second regions to form a graded ferroelectric sensing member.

23. (Amended) The method of [any of claims] claim 18[-21], wherein said irradiating includes scanning a predetermined path along the source with the laser.

25. (Amended) The method of [any of claims] claim 18[-21], wherein said forming includes depositing the mixture on a substrate.

26. (Amended) An oxygen sensor formed by the method of [any of claims] claim 18[-21].

31. (Amended) The method of [any of claims] claim 27[-30], wherein said generating the plumes includes irradiating a corresponding number of different portions of the first and second regions.

32. (Amended) The method of [any of claims] claim 27[-30], wherein said irradiating includes scanning across a predetermined path along the source with a laser.

34. (Amended) The method of [any of claims] claim 27[-30], wherein said forming includes depositing material from a first one of the plumes on a substrate.
35. (Amended) An oxygen sensor formed by the method of [any of claims] claim 27[-30].
41. (Amended) The apparatus of [any of claims] claim 36[-40], wherein a ratio between two compositional constituents increases along a predetermined direction through said sensing member to provide a corresponding compositional gradient.
43. (Amended) The apparatus of claim 41 [or 42], wherein said two compositional constituents are zirconia and titania.
44. (Amended) The apparatus of [any of claims] claim 36[-40] wherein said sensing member is formed of $\text{PbZr}_x\text{Ti}_y\text{O}_3$; wherein x is in a range of about 0.5 to about 0.8 and y is in a range of about 0.2 to about 0.5.
46. (Amended) A method of [use, comprising] detecting oxygen in an intake or exhaust stream of a vehicle with the apparatus of [any of claims] claim 36[-40].
49. (Amended) The combination of claim 47 [or 48], wherein said peak magnitude is in a range of about 1 volt per μm to about 1000 volts per μm .
51. (Amended) The combination of claim 47 [or 48] wherein said sensing member is comprised of a ferroelectric material.
52. (Amended) The combination of claim 47 [or 48], wherein said sensing member is comprised of a PZT material.
53. (Amended) The combination of claim 47 [or 48], wherein the system is operable to detect oxygen concentration at a temperature below about 400K.